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ISTITUTO DI GENETICA
UNIVERSITÀ DI PAVIA
VIA SANT'EPIFANIO, 14
27100 PAVIA

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Prof. Joshua Lederberg
Genetics Department
Stanford University
School of Medicine
Palo Alto, California 94305
U.S.A.

Telefoni: 23.029; 29.038 - Indirizzo telegrafico: Istgenetica - Pavia

Dear Joshua,

I have read the paper by Halpern and others on the utilization of mass spectrometry for the assay of amino-acids in plasma. It occurs to me that an extension of the method to cover all aminoacids in normal plasma might have some interesting applications. Here is one.

There is some direct evidence that Pygmies are more susceptible to Kwashiorkor when exposed to a protein low diet. We have data showing that healthy Pygmy adults have concentrations of aminoacids in plasma resembling those of Kwashiorkor - sort of midway with respect to normals. The attractive hypothesis can be made, that Pygmies, never having been exposed to selection for low-protein diets, (as they never were entirely in an agricultural economy) have not adapted to it. The adaptation of those who have had several thousands of years of agriculture, as practically all other Africans have, may be genetic but, in view of the relatively short time elapsed, it may be that selection is still incomplete and many individuals may still carry the original lack of resistance to a low-protein diet. These may be the people especially prone to Kwashiorkor.

One way to test this would be to investigate a number of twin pairs (in Africa) for their aminoacid patterns,possibly before and after weaning. Weaning marks the passage from high to low protein diet,and might be accompanied by signs of Kwashiorkor. There exists in Nigeria a number of tested twin pairs and more could be looked for. I would be prepared to go there to organize this, but present methods of aminoacid assay demand a large amount of plasma (10-15 ml) which is prohibitive for small children. Adult twins are much rarer, because of the high mortality, difficult to find because of lack of demographic reg-

istration, and less interesting for the purpose. Thus, a method of aminoacid assay on small amounts of plasma would be ideal, especiall as it seems possible to read the results on 50-100 lambdas, which can be obtained by fingerprick techniques.

Another item. Dr. Vittorio Sgaramella, a chemist from Pavia, has worked with Khorana for a couple of years and is still there. He was invited by Khorana to follow him at Boston (with a salary of 12,000 or more). He would rather spend a year or so at Stanford. His wife is a capable biometrician with excellent practice of computer work and has collaborated with me in the past for a long time. Are you interested in having them in Stanford? He might be very suitable for the directed transformation work you have in mind. I would appreciate an early answer, as he asked my advice.

starting in July

I have been interested by the idea of the doctorate of environmental health. Unquestionally mass spectrometry might be quite useful to detect small amounts of extraneous substances. Many possibilities come to the mind, but undoubtedly blind or semiblind surveys in highly polluted environments might be the simplest.

I am just back from Africa where I collected blood samples in Cameroun and Ethiopia. I have met John and Mimi Summerskill and they were extremely helpful. But there is hardly a trace of Pygmies in Ethiopia.

Who will be the new Dean? Has any progress been made?

Yours,

Luca